Barrios Technology & Angelo State University - Project Summary

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| **Employer Partner** | Barrios Technology, Barrios.io | **Designated Company Contact** | Devin Vyain  Ginger Kerrick |

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| **Company Description** | Barrios Technology is an award-winning, woman-owned and operated small aerospace business. We provide high-quality engineering, software, and technology integration solutions to government and commercial space flight programs, in the USA and the rest of the world.  We are driven by innovation and propelled by possibility. Barrios has been purposefully advancing humanity, on and off the planet, for over 40 years.  Your mission is our passion. Together we can go further. |
| **Project Description** | Barrios.io is a branch of Barrios Technology that brings modern data solutions to your industry, wherever you are. Input data, output value. We offer our expertise to reduce data sprawl and make your data processes valuable and profitable. Our data specialists seek to empower teams with database design, creation, and management, procedural data updates, and business intelligence standards, such as dynamic and responsive visualizations, interactive reporting, Key Performance Indicators (KPIs), alerts and monitoring, parameters inputs, data forecasting and trending, and more.  Barrios.io is seeking to work with talented students across the areas of Data Engineering, Data Analytics, Project Management, and Business Management on a diverse and flexible selection of real-world problems that benefit university students at multiple levels while bringing value to Barrios.io and our government and commercial space exploration industry.  **Project Mission Statement:**  Evaluate and provide insights and predictions into consumable usage rates, resupply logistics constraints, and previous projection accuracy based on ISS vehicle traffic schedule, crew compliment, minimum supply thresholds, and historicalsupply actuals.  **Objective Summary:**  The objective of this project is to assess historical data regarding the above ISS parameters and consumables supply to derive historical insights and prescribe predictive outcomes to minimize risks to mission success, refine usage rate assumptions, and identify upcoming logistics challenges in the strategic planning timeline.  **Data Sets:**   1. ISS Inventory Management System (IMS) historical data for the last two years as relates to Consumables items. To be cleared for public release. 2. ISS Flight Plan historical data for the last two years and the next two years. To be cleared for public release. 3. Human Space Flight Technical Integration Contract (HSFTIC) Consumables Analysis Business Rules 4. Historical Actuals derived from Mission Control Center (MCC) Gateway Environmental Controls and Life Support Systems (ECLSS) Tracker   **Assumptions:**   1. Historical data used for analysis should be limited to Jan. 1st, 2022 and onward. 2. Barrios will provide clean, structured data sets with accompanying data dictionaries 3. Barrios will meet with class (either virtually or in-person) at the beginning of the semester/term to provide an overview on the ISS and the relevant data sets, questions, predictive modeling challenges, and deliverables 4. In addition to data analysis insights and predictive model outcomes, ASU students will document data manipulation processes, software implementation details, and solution architecture to provide robust deliverable reports that satisfy the key components listed in Final Deliverables section below   **Questions:**   1. What is the percent difference between historical consumable usage rate assumptions and actual calculated usage rates in mission time frames between resupply? 2. What resupply quantities are necessary, considering planned resupply vehicle traffic from the ISS Flight Plan, planned On-Orbit Crew counts, and historical usage rates to sustain minimum supply thresholds, plus a 10% safety factor, through the next two years? 3. What resupply quantities meet the requirements of question #2 while minimizing launch vehicle quantity? (e.g., launching 10,000 granola bars would ensure the minimum thresholds are not violated, but is not a realistic or optimal strategy for balancing launch mass requirements with supply requirements)   **Predictive modeling:**   1. What month in the next two years of the Flight Plan timeline is most likely incur a violation of minimum supply thresholds? 2. Which consumables item(s) are most likely to incur a violation of minimum supply thresholds in the next two years of the future Flight Plan timeline? |
| **Final Deliverable(s)** | In a team of 3-5 students, each group will deliver a final report and presentation including the following key components:   * Analysis methodology * Technology stack * Data-driven insights and responses to the above questions * Predictive modeling algorithm description * Predictive modeling results from the above prompts * Data architecture recommendations * Unanswered questions |